

# PPTP

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## General Information

### Summary

PPTP (Point to Point Tunnel Protocol) supports encrypted tunnels over IP. The MikroTik RouterOS implementation includes support for PPTP client and server.

General applications of PPTP tunnels:

- For secure router-to-router tunnels over the Internet
- To link (bridge) local Intranets or LANs (when EoIP is also used)
- For mobile or remote clients to remotely access an Intranet/LAN of a company (see PPTP setup for Windows for more information)

Each PPTP connection is composed of a server and a client. The MikroTik RouterOS may function as a server or client - or, for various configurations, it may be the server for some connections and client for other connections. For example, the client created below could connect to a Windows 2000 server, another MikroTik Router, or another router which supports a PPTP server.

## Quick Setup Guide

To make a PPTP tunnel between 2 MikroTik routers with IP addresses **10.5.8.104** (PPTP server) and **10.1.0.172** (PPTP client), follow the next steps.

- Setup on PPTP server:

1. Add a user:

```
[admin@PPTP-Server] ppp secret> add name=jack password=pass \
\... local-address=10.0.0.1 remote-address=10.0.0.2
```

2. Enable the PPTP server:

```
[admin@PPTP-Server] interface pptp-server server> set enabled=yes
```

- Setup on PPTP client:

1. Add the PPTP client:

```
[admin@PPTP-Client] interface pptp-client> add user=jack password=pass \
\... connect-to=10.5.8.104 disabled=no
```

## Specifications

Packages required: *ppp*

License required: *level1 (limited to 1 tunnel), level3 (limited to 200 tunnels), level5*

Home menu level: */interface pptp-server, /interface pptp-client*

Standards and Technologies: [PPTP \(RFC 2637\)](#)

Hardware usage: *Not significant*

## Related Documents

- [Software Package Management](#)
- [IP Addresses and ARP](#)
- [PPP User AAA](#)
- [EoIP](#)

## Description

PPTP is a secure tunnel for transporting IP traffic using PPP. PPTP encapsulates PPP in virtual lines that run over IP. PPTP incorporates PPP and MPPE (Microsoft Point to Point Encryption) to make encrypted links. The purpose of this protocol is to make well-managed secure connections between routers as well as between routers and PPTP clients (clients are available for and/or included in almost all OSs including Windows).

PPTP includes PPP authentication and accounting for each PPTP connection. Full authentication and accounting of each connection may be done through a RADIUS client or locally.

MPPE 40bit RC4 and MPPE 128bit RC4 encryption are supported.

PPTP traffic uses TCP port 1723 and IP protocol GRE (Generic Routing Encapsulation, IP protocol ID 47), as assigned by the Internet Assigned Numbers Authority (IANA). PPTP can be used with most firewalls and routers by enabling traffic destined for TCP port 1723 and protocol 47 traffic to be routed through the firewall or router.

PPTP connections may be limited or impossible to setup through a masqueraded/NAT IP connection. Please see the Microsoft and RFC links at the end of this section for more information.

## Additional Documents

- [http://msdn.microsoft.com/library/backgrnd/html/understanding\\_pptp.htm](http://msdn.microsoft.com/library/backgrnd/html/understanding_pptp.htm)
- <http://support.microsoft.com/support/kb/articles/q162/8/47.asp>
- <http://www.ietf.org/rfc/rfc2637.txt?number=2637>
- <http://www.ietf.org/rfc/rfc3078.txt?number=3078>
- <http://www.ietf.org/rfc/rfc3079.txt?number=3079>

## PPTP Client Setup

Home menu level: */interface pptp-client*

### Property Description

**add-default-route** (*yes | no*; default: **no**) - whether to use the server which this client is connected to as its default router (gateway)

**allow** (*multiple choice: mschap2, mschap1, chap, pap*; default: **mschap2, mschap1, chap, pap**) - the protocol to allow the client to use for authentication

**connect-to** (*IP address*) - The IP address of the PPTP server to connect to

**mru** (*integer*; default: **1460**) - Maximum Receive Unit. The optimal value is the MRU of the interface the tunnel is working over decreased by 40 (so, for 1500-byte ethernet link, set the MRU to 1460 to avoid fragmentation of packets)

**mtu** (*integer*; default: **1460**) - Maximum Transmission Unit. The optimal value is the MTU of the interface the tunnel is working over decreased by 40 (so, for 1500-byte ethernet link, set the MTU to 1460 to avoid fragmentation of packets)

**name** (*name*; default: **pptp-outN**) - interface name for reference

**password** (*text*; default: **""**) - user password to use when logging to the remote server

**profile** (*name*; default: **default**) - profile to use when connecting to the remote server

**user** (*text*) - user name to use when logging on to the remote server

## Example

To set up PPTP client named **test2** using username **john** with password **john** to connect to the **10.1.1.12** PPTP server and use it as the default gateway:

```
[admin@MikroTik] interface pptp-client> add name=test2 connect-to=10.1.1.12 \  
 \... user=john add-default-route=yes password=john  
[admin@MikroTik] interface pptp-client> print  
Flags: X - disabled, R - running  
 0 X name="test2" mtu=1460 mru=1460 connect-to=10.1.1.12 user="john"  
     password="john" profile=default add-default-route=yes  
  
[admin@MikroTik] interface pptp-client> enable 0
```

## Monitoring PPTP Client

Command name: */interface pptp-client monitor*

### Property Description

**encoding** (*text*) - encryption and encoding (if asymmetric, separated with '/') being used in this connection

**status** (*text*) - status of the client

- **Dialing** - attempting to make a connection
- **Verifying password...** - connection has been established to the server, password verification in progress
- **Connected** - self-explanatory
- **Terminated** - interface is not enabled or the other side will not establish a connection uptime (time) - connection time displayed in days, hours, minutes and seconds

**uptime** (*time*) - connection time displayed in days, hours, minutes and seconds

## Example

Example of an established connection:

```
[admin@MikroTik] interface pptp-client> monitor test2  
uptime: 4h35s  
encoding: MPPE 128 bit, stateless  
status: Connected  
[admin@MikroTik] interface pptp-client>
```

## PPTP Server Setup

Home menu level: */interface pptp-server server*

### Description

The PPTP server creates a dynamic interface for each connected PPTP client. The PPTP connection count from clients depends on the license level you have. Level1 license allows 1 PPTP client, Level3 or Level4

licenses up to 200 clients, and Level5 or Level6 licenses do not have PPTP client limitations.

To create PPTP users, you should consult the [PPP secret](#) and [PPP Profile](#) manuals. It is also possible to use the MikroTik router as a RADIUS client to register the PPTP users, see the [manual](#) how to do it.

## Property Description

**authentication** (*multiple choice: pap | chap | mschap1 | mschap2*; default: **mschap2**) - authentication algorithm

**default-profile** - default profile to use

**enabled** (*yes | no*; default: **no**) - defines whether PPTP server is enabled or not

**keepalive-timeout** (*time*; default: **30**) - defines the time period (in seconds) after which the router is starting to send keepalive packets every second. If no traffic and no keepalive responses has come for that period of time (i.e.  $2 * \text{keepalive-timeout}$ ), not responding client is proclaimed disconnected

**mru** (*integer*; default: **1460**) - Maximum Receive Unit. The optimal value is the MRU of the interface the tunnel is working over decreased by 40 (so, for 1500-byte ethernet link, set the MRU to 1460 to avoid fragmentation of packets)

**mtu** (*integer*; default: **1460**) - Maximum Transmission Unit. The optimal value is the MTU of the interface the tunnel is working over decreased by 40 (so, for 1500-byte ethernet link, set the MTU to 1460 to avoid fragmentation of packets)

## Example

To enable PPTP server:

```
[admin@MikroTik] interface pptp-server server> set enabled=yes
[admin@MikroTik] interface pptp-server server> print
      enabled: yes
      mtu: 1460
      mru: 1460
      authentication: mschap2,mschap1
      keepalive-timeout: 30
      default-profile: default
[admin@MikroTik] interface pptp-server server>
```

## PPTP Users

### Description

The PPTP users are authenticated through a RADIUS server (if configured), and if RADIUS fails, then the local PPP user database is used. See the respective manual sections for more information:

- [RADIUS client](#)
- [PPP User AAA](#)

## PPTP Server User Interfaces

Home menu level: */interface pptp-server*

## Description

There are two types of items in PPTP server configuration - static users and dynamic connections. A dynamic connection can be established if the user database or the **default-profile** has its **local-address** and **remote-address** set correctly. When static users are added, the default profile may be left with its default values and only PPP user (in **/ppp secret**) should be configured. **Note** that in both cases PPP users must be configured properly.

## Property Description

**client-address** (*IP address*) - shows (cannot be set here) the IP address of the connected client

**encoding** (*text*) - encryption and encoding (if asymmetric, separated with '/') being used in this connection

**mtu** (*integer*) - (cannot be set here) client's MTU

**name** (*name*) - interface name

**uptime** (*time*) - shows how long the client is connected

**user** (*name*) - the name of the user that is configured statically or added dynamically

## Example

To add a static entry for **ex1** user:

```
[admin@MikroTik] interface pptp-server> add user=ex1
[admin@MikroTik] interface pptp-server> print
Flags: X - disabled, D - dynamic, R - running
#      NAME      USER      MTU      CLIENT-ADDRESS  UPTIME      ENC...
0  DR <pptp-ex>    ex         1460     10.0.0.202      6m32s      none
1      pptp-in1    ex1
[admin@MikroTik] interface pptp-server>
```

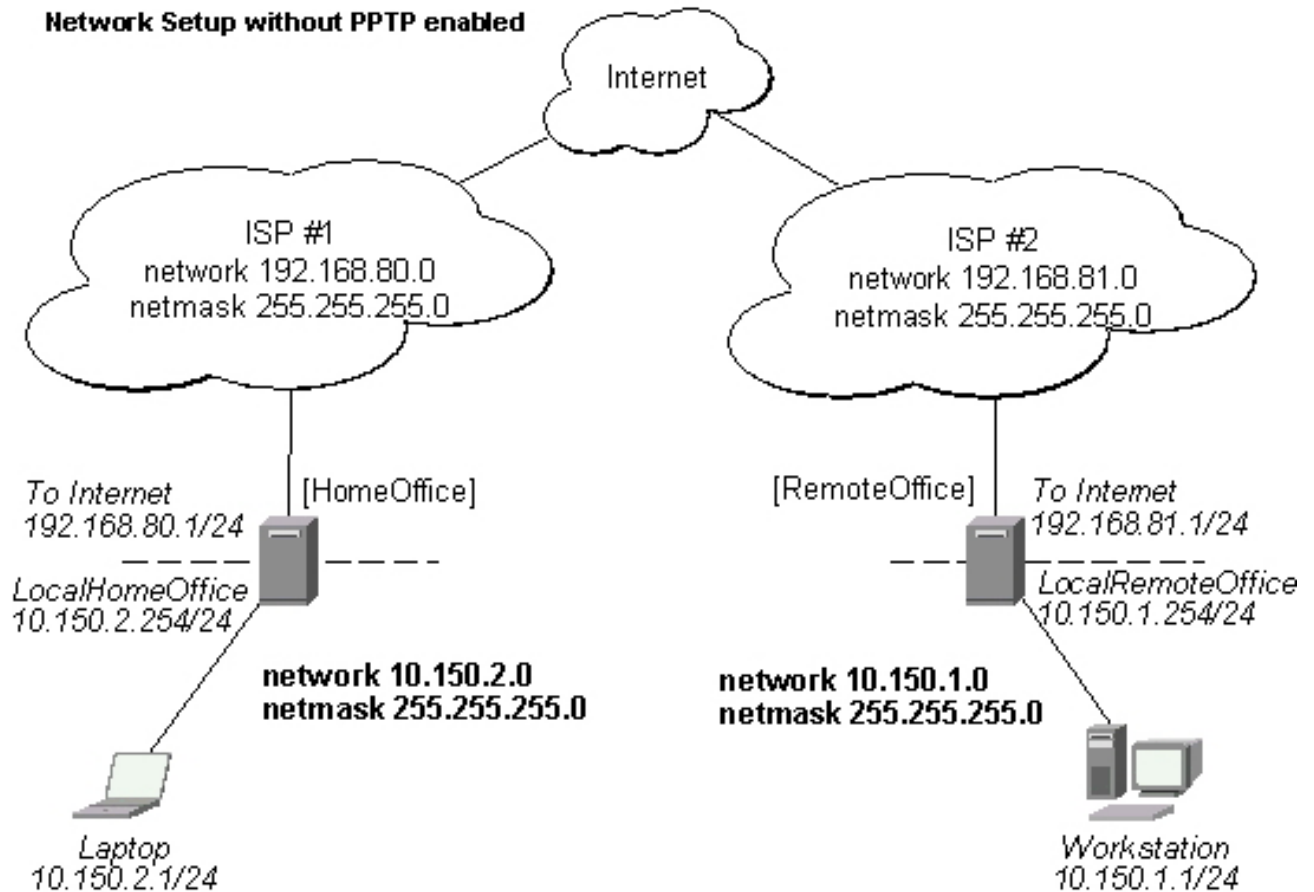
In this example an already connected user **ex** is shown besides the one we just added.

## PPTP Application Examples

### Router-to-Router Secure Tunnel Example

The following is an example of connecting two Intranets using an encrypted PPTP tunnel over the Internet.

## Network Setup without PPTP enabled



There are two routers in this example:

- [HomeOffice]  
Interface LocalHomeOffice 10.150.2.254/24  
Interface ToInternet 192.168.80.1/24
- [RemoteOffice]  
Interface ToInternet 192.168.81.1/24  
Interface LocalRemoteOffice 10.150.1.254/24

Each router is connected to a different ISP. One router can access another router through the Internet.

On the `Preforma` PPTP server a user must be set up for the client:

```
[admin@HomeOffice] ppp secret> add name=ex service=pptp password=lkjrht
local-address=10.0.103.1 remote-address=10.0.103.2
[admin@HomeOffice] ppp secret> print detail
Flags: X - disabled
0 name="ex" service=pptp caller-id="" password="lkjrht" profile=default
local-address=10.0.103.1 remote-address=10.0.103.2 routes=""
[admin@HomeOffice] ppp secret>
```

Then the user should be added in the PPTP server list:

```
[admin@HomeOffice] interface pptp-server> add user=ex
[admin@HomeOffice] interface pptp-server> print
Flags: X - disabled, D - dynamic, R - running
# NAME USER MTU CLIENT-ADDRESS UPTIME ENC...
0 pptp-inl ex
```

```
[admin@HomeOffice] interface ptp-server>
```

And finally, the server must be enabled:

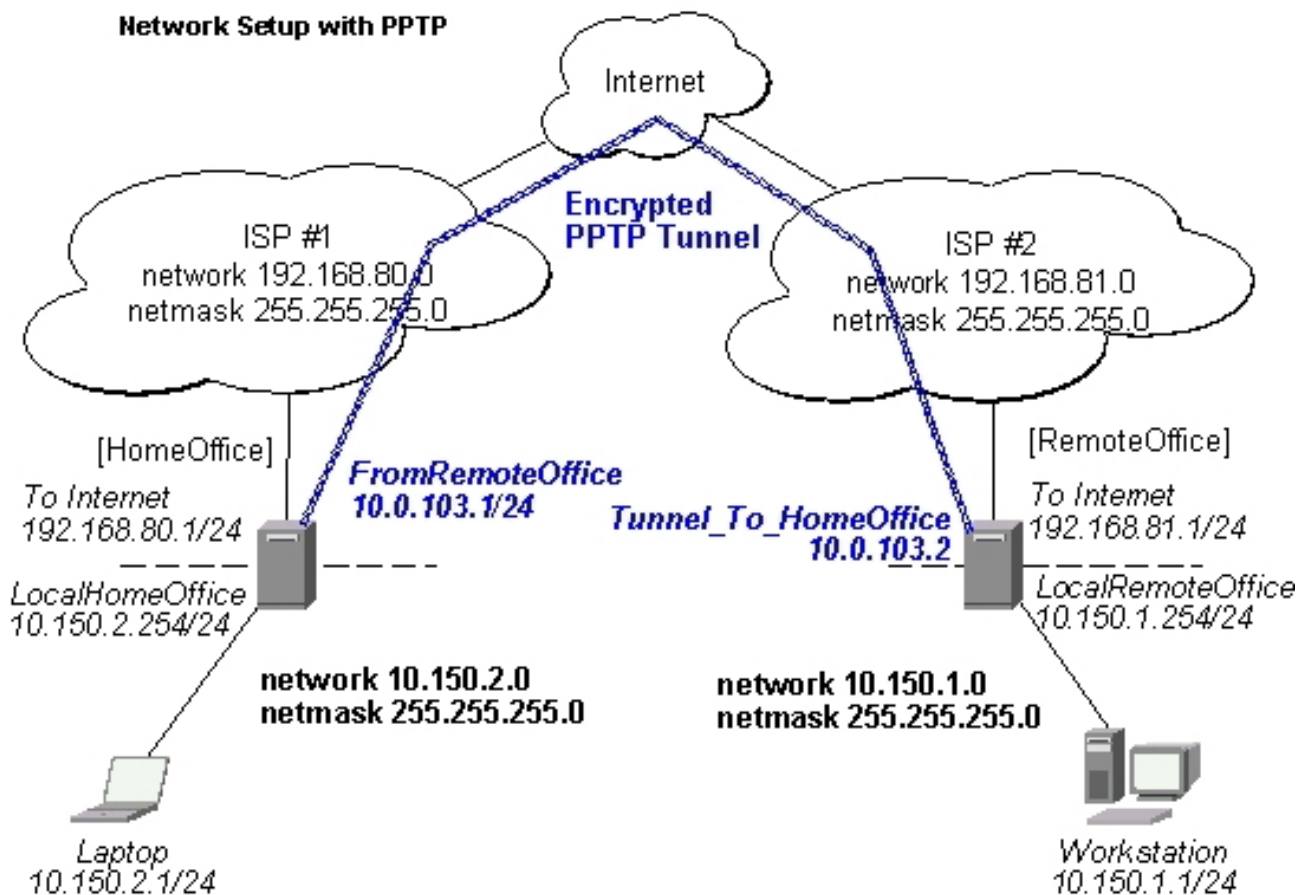
```
[admin@HomeOffice] interface ptp-server server> set enabled=yes
[admin@HomeOffice] interface ptp-server server> print
    enabled: yes
      mtu: 1460
      mru: 1460
  authentication: mschap2
  default-profile: default
[admin@HomeOffice] interface ptp-server server>
```

Add a PPTP client to the RemoteOffice router:

```
[admin@RemoteOffice] interface ptp-client> add connect-to=192.168.80.1 user=ex \
\... password=lkjrht disabled=no
[admin@RemoteOffice] interface ptp-client> print
Flags: X - disabled, R - running
 0 R name="ptp-out1" mtu=1460 mru=1460 connect-to=192.168.80.1 user="ex"
   password="lkjrht" profile=default add-default-route=no

[admin@RemoteOffice] interface ptp-client>
```

Thus, a PPTP tunnel is created between the routers. This tunnel is like an Ethernet point-to-point connection between the routers with IP addresses 10.0.103.1 and 10.0.103.2 at each router. It enables 'direct' communication between the routers over third party networks.



To route the local Intranets over the PPTP tunnel you need to add these routes:

```
[admin@HomeOffice] > ip route add dst-address 10.150.1.0/24 gateway 10.0.103.2
```

```
[admin@RemoteOffice] > ip route add dst-address 10.150.2.0/24 gateway 10.0.103.1
```

On the PPTP server it can alternatively be done using **routes** parameter of the user configuration:

```
[admin@HomeOffice] ppp secret> print detail
Flags: X - disabled
 0 name="ex" service=pptp caller-id="" password="lkjrht" profile=default
  local-address=10.0.103.1 remote-address=10.0.103.2 routes=""

[admin@HomeOffice] ppp secret> set 0 routes="10.150.1.0/24 10.0.103.2 1"
[admin@HomeOffice] ppp secret> print detail
Flags: X - disabled
 0 name="ex" service=pptp caller-id="" password="lkjrht" profile=default
  local-address=10.0.103.1 remote-address=10.0.103.2
  routes="10.150.1.0/24 10.0.103.2 1"

[admin@HomeOffice] ppp secret>
```

Test the PPTP tunnel connection:

```
[admin@RemoteOffice]> /ping 10.0.103.1
10.0.103.1 pong: ttl=255 time=3 ms
10.0.103.1 pong: ttl=255 time=3 ms
10.0.103.1 pong: ttl=255 time=3 ms
ping interrupted
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 3/3.0/3 ms
```

Test the connection through the PPTP tunnel to the LocalHomeOffice interface:

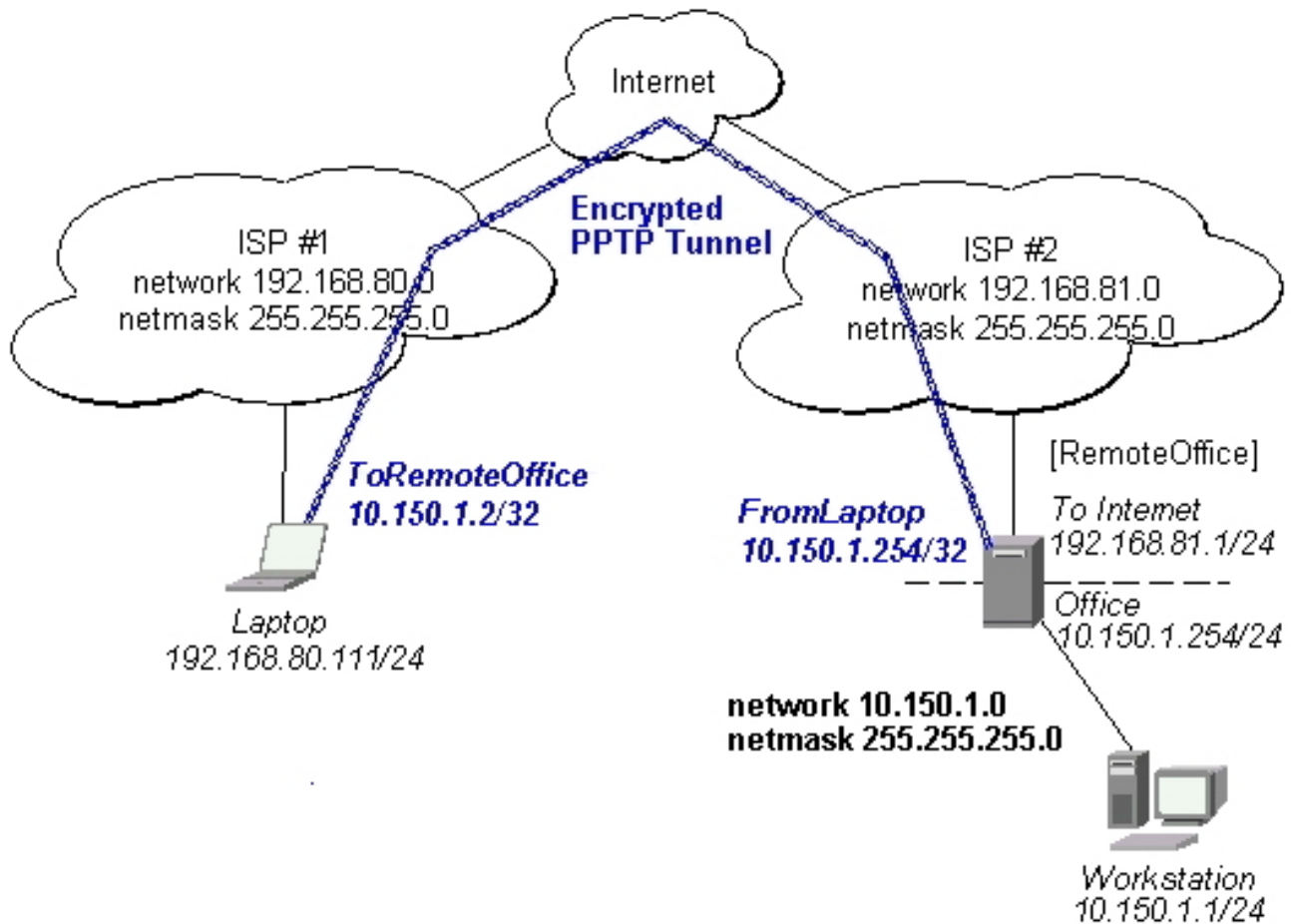
```
[admin@RemoteOffice]> /ping 10.150.2.254
10.150.2.254 pong: ttl=255 time=3 ms
10.150.2.254 pong: ttl=255 time=3 ms
10.150.2.254 pong: ttl=255 time=3 ms
ping interrupted
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 3/3.0/3 ms
```

To bridge a LAN over this secure tunnel, please see the example in the 'EoIP' section of the manual. To set the maximum speed for traffic over this tunnel, please consult the 'Queues' section.

## Connecting a Remote Client via PPTP Tunnel

The following example shows how to connect a computer to a remote office network over PPTP encrypted tunnel giving that computer an IP address from the same network as the remote office has (without need of bridging over EoIP tunnels)

Please, consult the respective manual on how to set up a PPTP client with the software You are using.



The router in this example:

- [RemoteOffice]  
Interface ToInternet 192.168.81.1/24  
Interface Office 10.150.1.254/24

The client computer can access the router through the Internet.

On the PPTP server a user must be set up for the client:

```
[admin@RemoteOffice] ppp secret> add name=ex service=pptp password=lkjrht
local-address=10.150.1.254 remote-address=10.150.1.2
[admin@RemoteOffice] ppp secret> print detail
Flags: X - disabled
 0 name="ex" service=pptp caller-id="" password="lkjrht" profile=default
  local-address=10.150.1.254 remote-address=10.150.1.2 routes=""
[admin@RemoteOffice] ppp secret>
```

Then the user should be added in the PPTP server list:

```
[admin@RemoteOffice] interface pptp-server> add name=FromLaptop user=ex
[admin@RemoteOffice] interface pptp-server> print
Flags: X - disabled, D - dynamic, R - running
# NAME USER MTU CLIENT-ADDRESS UPTIME ENC...
0 FromLaptop ex
[admin@RemoteOffice] interface pptp-server>
```

And the server must be enabled:

```
[admin@RemoteOffice] interface pptp-server server> set enabled=yes
[admin@RemoteOffice] interface pptp-server server> print
    enabled: yes
        mtu: 1460
        mru: 1460
    authentication: mschap2
    default-profile: default
[admin@RemoteOffice] interface pptp-server server>
```

Finally, the proxy APR must be enabled on the 'Office' interface:

```
[admin@RemoteOffice] interface ethernet> set Office arp=proxy-arp
[admin@RemoteOffice] interface ethernet> print
Flags: X - disabled, R - running
#   NAME           MTU   MAC-ADDRESS      ARP
0  R ToInternet    1500  00:30:4F:0B:7B:C1  enabled
1  R Office        1500  00:30:4F:06:62:12  proxy-arp
[admin@RemoteOffice] interface ethernet>
```

## PPTP Setup for Windows

Microsoft provides PPTP client support for Windows NT, 2000, ME, 98SE, and 98. Windows 98SE, 2000, and ME include support in the Windows setup or automatically install PPTP. For 95, NT, and 98, installation requires a download from Microsoft. Many ISPs have made help pages to assist clients with Windows PPTP installation.

- [http://www.real-time.com/Customer\\_Support/PPTP\\_Config/pptp\\_config.html](http://www.real-time.com/Customer_Support/PPTP_Config/pptp_config.html)
- [http://www.microsoft.com/windows95/downloads/contents/WUAdminTools/S\\_WUNetworkingTools/W95WinsockL](http://www.microsoft.com/windows95/downloads/contents/WUAdminTools/S_WUNetworkingTools/W95WinsockL)

## Sample instructions for PPTP (VPN) installation and client setup - Windows 98SE

If the VPN (PPTP) support is installed, select 'Dial-up Networking' and 'Create a new connection'. The option to create a 'VPN' should be selected. If there is no 'VPN' options, then follow the installation instructions below. When asked for the 'Host name or IP address of the VPN server', type the IP address of the router. Double-click on the 'new' icon and type the correct user name and password (must also be in the user database on the router or RADIUS server used for authentication).

The setup of the connections takes nine seconds after selection the 'connect' button. It is suggested that the connection properties be edited so that 'NetBEUI', 'IPX/SPX compatible', and 'Log on to network' are unselected. The setup time for the connection will then be two seconds after the 'connect' button is selected.

To install the 'Virtual Private Networking' support for Windows 98SE, go to the 'Setting' menu from the main 'Start' menu. Select 'Control Panel', select 'Add/Remove Program', select the 'Windows setup' tab, select the 'Communications' software for installation and 'Details'. Go to the bottom of the list of software and select 'Virtual Private Networking' to be installed.

## Troubleshooting

### Description

- **I use firewall and I cannot establish PPTP connection**

Make sure the TCP connections to port 1723 can pass through both directions between your sites. Also, IP protocol 47 should be passed through